Annual Report

1989-90

Centre for Resource Studies

Annual Report for the Period

1 May 1989 to 30 April 1990

90-06176/

Centre for Resource Studies

Origins and Objectives

The Centre for Resource Studies (CRS) is a co-operative research institute established at Queen's University in 1973. Sponsored by the federal Department of Energy, Mines and Resources and The Mining Association of Canada, under the auspices of the University, its function is to improve understanding of the complex questions and issues underlying policies related to all mineral resources (other than oil and gas). The purposes of the Centre are accomplished through a program of research and publication, and by providing opportunities for liaison among representatives of federal and provincial governments, industry, universities, and other interested groups.

Summary of Activities 1975-90

The Centre undertakes to support multidisciplinary research with the objective of examining mineral-related economic and policy issues and their implications for industry and government. The research is carried out both at the Centre and through contracts with qualified investigators, usually at Canadian universities but also within a wide international network. Small exploratory studies are also funded by means of grants-in-aid of research. Research funded by or through the Centre is published, generally as monographs and working papers. As of April 1990, twenty-five monographs and forty-four working papers have been published. In the series of technical papers introduced in 1981, ten have been published to date. In addition, the Centre publishes *CRS Perspectives*, an occasional newsletter commenting on issues of current interest and significance, which is distributed to a mailing list of approximately 3500 individuals and organizations. Since its inception, the Centre has published about 130 publications, with an average circulation of 500 copies, and 32 issues of *CRS Perspectives*.

In 1977 the Centre held the first of a series of Policy Discussion Seminars which bring together, in a constructive working environment, invited representatives with a diversity of interests to discuss a topic of current policy concern. Each gives rise to a set of proceedings which contains the text of papers presented at the seminar, as well as a digest of the discussions. Twenty seminars have been held to date.

Through this program of research, seminars, and publication, the Centre contributes to informed discussions and a better understanding of important problems. Further details of CRS activities may be found in later sections of this report. The Executive Director and Board of Directors wish to acknowledge the contribution of CRS staff, associates, and committee members. Without their strenuous efforts and generous allocation of time, the accomplishments of the past year would not have been possible.

A notable development in CRS relations with governments across Canada this year has been the joining of all ten provinces and two territories in support of the CRS publication series, *Mineral Policy Update*, which was last released in 1984. The provincial subscriptions will permit completion of the series to 1992, plus a volume taking a retrospective look at policy trends in the 1980s.

CRS research activities during the year continued to focus on international competitive position and on domestic mineral supply issues. Publications and contract reports included a study of federal and provincial mining taxation; analyses of the economic potential and competitiveness of base-metal and gold mining in Newfoundland, Quebec, Manitoba and Ontario; an examination of the economic aspects of gold exploration; an assessment of the barriers to U.S. imports of Canadian copper, potash and uranium; an appraisal of federal programs and policies that promote native participation in mineral activities; and the proceedings from the 19th Policy Discussion Seminar, which considered the marketing of nonferrous metals. Demand for two of the Centre's publications is such that reprinting has been necessary: Proceedings No. 14, *Mining Communities: Hard Lessons for the Future*, is in its second printing, and Working Paper 35, *Effects of Location on the Competitive Position of Mineral Exploration and Development Opportunities in Canada*, is in its third printing.

Several projects continue into the next year, such as a broad study of Canada's university teaching and research resources in the development of advanced industrial materials; further study of the Canadian coal industry and its prospects in international markets; an examination of Canadian mineral trade with China; nickel and public policy; and an analysis of R&D activity in the Ontario metals industry. Brian Mackenzie is furthering the development of his mineral deposit data base, which now covers gold, uranium and nickel, as well as base metals. A project recently approved is the update and expansion of *Environmental Impact of Mining in Canada*, by E.A. Ripley, R.E. Redmann with J. Maxwell, originally published in 1978 and the Centre's all-time bestseller.

Meetings and seminars continue to be important vehicles for communication at CRS. Two meetings were held in the past year. Representatives of the federal and provincial/territorial governments spent three days at the Centre in December to evaluate the federal/provincial Mineral Development Agreements and to develop a framework for their possible renewal. The 20th Policy Discussion Seminar was held in March 1990 to deal with issues related to ensuring an adequate

supply of properly trained professionals and skilled technical workers for the mining industry in Canada.

Xu Tao, nonferrous metals expert at the Chinese Academy of Social Sciences in Beijing, was a visitor at the Centre throughout the past year. He has received several CRS grants in aid of research for the preparation of articles for *CRS Perspectives*, on industrial strategy and structural change in China, and the implications for nonferrous metals.

A number of changes in operations have been introduced during the year, to improve the support of research and publication activities. The CRS mailing list and library listings have been converted to computerized data bases for ease of access and greater flexibility. All CRS publications are now prepared in-house as camera-ready copy, reducing both costs and time, and increasing CRS control over the quality of the production. The new logo and covers you have already seen on last year's Annual Report.

The Centre's quarters at 100 Barrie Street, on the edge of Queen's campus, have undergone extensive renovations as the old house is slowly transformed into a more practical and businesslike configuration. The decision to decline the University's offer of space in the new Policy Studies Building has proved a wise one, as our present quarters allow the flexibility to accommodate varying numbers of researchers and other visitors. The contrast between the old ivy-covered brick and the high-rise modernity in the background of the picture below gives an indication of other reasons for our preference. Some of the building's unusual architectural features appear in the pictures throughout this report. We are pleased by the University's decision not only to let us stay, but also to undertake the renovations. Friends and colleagues are invited to drop in if they are in the vicinity, to see our operations, meet our staff, and look over our growing collection of CRS publications.

Research Completed in 1989/90

Research Funded by CRS

U.S. Trade Barriers and Canadian Minerals: Copper, Potash and Uranium
David Haglund and Alex von Bredow, Queen's University

This study explored the extent to which Canadian export interests in three commodities - copper, potash, and uranium - are or may be affected by the apparent increase in U.S. Congressional sentiment for protectionism. The author examined the protectionist challenge as part of a broader research project on "Canadian Interests and U.S. Mineral Policy" with the assistance of a CRS grant-in-aid in 1984. This project developed further some of the issues examined in the earlier study and extended the scope of the inquiry to include copper and potash. Several journal articles and a book, *The New Geopolitics of Minerals: Canada and the International Resource Trade* (published by UBC Press), have resulted from Dr. Haglund's research thus far. This study was published as a CRS monograph.

Federal and Provincial Taxation of Resource Industries: Impact and Implications for Reform
Robin Boadway, Ken McKenzie and Jack Mintz, Queen's University

The purpose of this study was to describe and assess how corporate and provincial mining taxes influence the investment decisions and production structure of Canadian mining firms. While earlier literature tried to evaluate the effect of taxation by measuring the average tax rate, this study measures the "effective" tax rate (the tax imposed on the marginal project). In addition to providing an analysis of the impact of taxes on mining firms, the researchers proposed measures for tax reform based on their findings. This study was published as a CRS monograph.

Does a High Level of Subsidy Reduce the Effort to Minimize Costs?
K.S. Palda, School of Business, Queen's University

The theory developed in this research is relevant to any program which distorts the firm's factor costs. In the case of extra tax deductions for specific activities, or when flow-through shares are available to finance the investment, the firm has a different cost structure and may change the inputs into the production function and, hence, operate less efficiently. The findings of this research could be relevant to developing policies relating to the taxation of resource production. The findings may also suggest ways to improve subsidy programs in general, not only for mineral exploration, but also research and development and other programs where the government intervenes with incentives. Manuscript received and in review process.

Evolution of the Manufacturing Components in the Ontario Metal Mining Industry

Alan Green and Ann Green, Department of Economics, Queen's University

This study, funded by a grant from the Ontario Ministry of Northern Development and Mines, studied the evolution of the manufacturing component of mining production in the province of Ontario. This work was seen as part of the general review of the Ontario Mining Act, particularly the requirements for Domestic Processing set out in Section 104 of the Act. The study examined the extent of domestic processing by specific metal, i.e. copper, nickel, gold, iron ore, etc. The analytical focus of this exercise was to examine the extent of value-added growth by particular metal groups over time.

Potential Value of Base Metal and Gold Mining in Quebec

Brian W. Mackenzie, Michael Doggett and Michel Bilodeau, Centre for Resource Studies

The objective of this project was to assess the economic potential of mineral exploration and mine development in Quebec. The evaluation was based on $2.8 billion of base metal and gold exploration expenditures in Quebec during the 40-year period 1946-85, and on 146 significant base metal and gold deposits discovered to 1985. Results are intended to provide background for a Quebec government study of the financing of mineral exploration and development. The final report was submitted on March 15th.

Impact of Taxation on the Economic Viability and Competitive Position of Mining Projects in the Canadian Uranium Industry

Brian W. Mackenzie, Michael Doggett and Michel Bilodeau, Centre for Resource Studies

Representative uranium-mining project profiles are developed for four types of deposit: high-grade unconformity type, quartz pebble conglomerate type, conventional-grade unconformity type, and uranium-base metal type. Each of the four projects is first evaluated on a potential, before-tax basis. Then, the impact of taxation on each project is examined for three locations: Saskatchewan, one other Canadian province or territory, and one Australian state or territory. Results are to be presented, compared, and analyzed using economic measures of project viability, investment incentive, tax burden, and competitive position. This project was funded by the Uranium and Nuclear Energy Branch of Energy, Mines and Resources Canada, and the final report was submitted on March 30th.

Research in Progress

Research Funded by CRS

Economic Analysis of Western Canadian Export Coal Supply

David L. Anderson, School of Business, Queen's University

This study will examine the economic structure of the western Canadian export coal industry. It will address the merits of the industry's rapid development since 1960, especially in the post-1980 period. In this regard, particular attention will be placed on the debate surrounding the northeast British Columbia coal project. The study will also describe and assess the problems currently facing export coal producers and outline the industry's future prospects.

Australian and Canadian Export Coal: A Policy Analysis of Relative Competitiveness

David L. Anderson, School of Business, Queen's University; and Donald W. Barnett, Macquarie University, Australia

The objective of this study is to assess the relative competitiveness of Australian and Canadian export coals in the Pacific Rim market. The analysis focuses on the domestic cost structure of each industry with special attention given to operating costs, non-profit and profit-based taxes, domestic transportation levies, and infrastructure financing arrangements.

Pricing and Trade Policy in the Canadian Resource Sector

Tim Hazledine, Department of Agricultural Economics, University of British Columbia

This study will analyze the impact on the resource sector of future cuts in Canadian and foreign tariffs on tradable goods. The study will examine both the direct (partial equilibrium) impact that elimination or reduction of a tariff on a resource commodity has on the price paid in Canada for that commodity, and the indirect (general equilibrium) impact through changes in input prices and the exchange rate of across-the-board tariff changes on all traded goods. As well, the implications for the sector of flattening of "effective protection" (higher tariffs on more highly processed products) will be analyzed.

Mineral Policy Update
Moira Jackson, Centre for Resource Studies

This study monitors mineral policy and program changes made by the federal government, the territories, and the provinces.

Mineral Deposit Database
Brian Mackenzie and Michael Doggett, Centre for Resource Studies

An extensive mineral deposit database has been developed at the Centre for Resource Studies since 1975 to assess the potential value of mining in Canada, and to measure the direct effects of government mineral policies. The last comprehensive update of this information was in 1983, including information for 291 possible economic deposits discovered to 1977, and total base metal expenditures estimated for the period 1946-77.

The purpose of the present project is to revise and extend this database and the related evaluation procedures to 1988, and to extend the coverage to include gold mining. The first part of this update was carried out in 1987-88 as part of the projects externally funded by the Ontario and Newfoundland governments. This work is now continuing in conjunction with the CRS contracts funded by the Quebec and Manitoba governments.

Economic Analysis of Canadian Gold Supply
Brian Mackenzie and Michael Doggett, Centre for Resource Studies

A comprehensive mineral deposit data base is being assembled, documenting short-, medium-, and long-term aspects of Canadian gold supply, concentrating on trends during the 1946-85 period. This information has been organized on microcomputer spreadsheets for evaluation and analysis. The plan is to integrate this work with the economic evaluation procedures and base metal data base which has been developed at CRS since 1975.

A paper on gold exploration economics, arising from this research, was published as "Economic Guidelines for Gold Exploration in the Western Canadian Shield" in *Gold in the Western Shield*, ed. L.A. Clark, Special Volume 38, CIMM, Montreal, 1986. Two papers were prepared for the CRS policy workshop on Long-Term Prospects for Gold Mining. One was published as CRS Working Paper No. 41: *Economic Trends in Canadian Gold Supply*. The other, "Long-Term Breakeven Price for Canadian Gold Supply" (with Donald Cranstone) was published as part of CRS Proceedings 20. The data base was used for the externally funded contracts with the Ontario Ministry of Northern Development and Mines, and the Newfoundland Department of Mines completed in 1988. The final reports from these projects have been revised and published as CRS Technical Papers 9 and 10.

This research was also the basis for a paper presented at Bicentennial Gold 88 in Melbourne, May 1988, which has now been expanded into a CRS working paper, *Economic Aspects of Gold Exploration: How Much Is Too Much?* published in January 1990 as CRS Working Paper No. 44. Project results were presented by the researchers as principal session leaders in the "Gold Deposit Evaluation" seminar held at the Helsinki University of Technology in October 1988. The research was also used for a paper entitled "Trends in Exploration Performance: The Search for Base Metals and Gold in Canada" presented at the March 1989 annual meeting of the Prospectors and Developers Association.

The data base is being extended to include 1986, 1987, and 1988, is presently being applied in externally funded contract work for Ministère de l'Energie et des Ressources, Gouvernement du Québec, and for the Manitoba Department of Energy and Mines. The researchers have been invited to present a keynote address at Brazil Gold '91 on "Worldwide Trends in Gold Supply".

PCDEP/PCSIM Software Package Development
Brian Mackenzie, Centre for Resource Studies, and Michel Bilodeau, McGill University

This project involves the development of a software package based on the existing software used by Bilodeau for analysis of Mackenzie's data base, and on the development of a user manual to make the software accessible to purchasers. The software will be extended to include current actual Canadian income and mining systems; integrated company basis of taxation; approximation of selected foreign tax systems; and a generalized deposit revenue and cost option. The manual will describe the economic evaluation techniques used, outline the information and estimation requirements, discuss the taxation considerations, and provide detailed instructions on use of the software, as well as case studies as illustrations. The package will be produced and marketed by CRS.

China and the World Mineral Markets: Threats and/or Opportunities
Carmine Nappi, École des Hautes Études Commerciales

This study will essentially be an economic and a statistical analysis of China's mineral industry. It will present the main characteristics of this industry, identify (and explain) the minerals for which China has a clear comparative advantage or disadvantage on the international market, analyze the effects of China's mineral exports and importers on western markets and evaluate the policy implications for the Canadian government and producers. The analysis will cover the 1970-1988 period, with some speculations for the period 1990-2005. A special emphasis will be placed on minerals and metals which are particularly important for Canadian producers: aluminum, asbestos, copper, iron ore and steel products, lead, nickel, and zinc.

The Impact of State-Owned or State-Assisted Mines and Smelters on International Markets
Ciaran O'Fairchellaigh, Griffith University

This study will examine the implications for producers in "free market" situations (i.e. in Canada and Australia) of competing with producers whose input costs and/or output levels are influenced by non-commercial criteria. The researcher will concentrate mainly on copper, iron ore, and aluminium. Dr. O'Fairchellaigh visited CRS for three months in 1986 to collect data and conduct interviews on the Canadian situation.

Translations of East European Articles on Effects of Mining on the Environment
G. Kenyon Rutherford, Department of Geography, Queen's University

In recent years a considerable volume of research on the effects of the mining industry on the environment has been carried out in Eastern Europe. The results of much of this work is now available in publications originating in USSR, East Germany, Czechoslovakia, Poland, Bulgaria and Hungary. A reasonable selection of these are archived in the CANMET library in Ottawa. As the results of some of this research may be germane to the Canadian mining industry, the objectives of research is to provide: a list of titles of appropriate articles published in English in these journals; a list of articles for which there is an English/French summary; and a list of article title translations for other relevant articles. Preliminary report received.

Development and Restructuring of China's Metal Mining Industry
Xu Tao, Centre for Resource Studies

China's potential for supply and demand for mineral products has been a subject of much speculation. This project considers primarily the manner and potential for success of the forthcoming restructuring of China's metal mining industry. The investigation will compare and analyze information from different sources, including recent Chinese official statistical data. The interests of China and its trading partners will be considered as well as those of Canadian mineral producers.

Effects of Public Policy on Competitive Position in the Nickel Industry
Margot Wojciechowski, Centre for Resource Studies

The United Nations Industrial Development Organization is sponsoring a study on the impact of public policy on competitive position in nonferrous metals. CRS has undertaken to prepare the chapter on nickel.

R&D Funding in the Mineral Sector
Margot Wojciechowski, Centre for Resource Studies

The project draws on the information gathered in the course of two comparative studies of mineral-related R&D funding conducted by CRS, one in Earth Sciences which was commissioned by the Canadian Geoscience Council, and one in mining and metallurgy which was commissioned by CANMET. This second phase of the study will extend the analysis and lead to several CRS publications drawing on the experiences of the eight OECD countries included in the original study.

Externally Funded Research

Firm Level Productivity Measurement for the Ontario Metal Mining Industry
Alan Green and Ann Green, Department of Economics, Queen's University

This study builds on previous work by the researchers in this area. Using more detailed observations on inputs and outputs it will be possible to assess the impact of such factors as industry rationalization and changes in product mix on the industry's performance. In addition, analyses can be made to differentiate the effects on profits due to price changes and due to productivity improvement. This micro study will provide the government and industry with a new tool to aid in the decision-making process. The evidence for the study will require information drawn from the Census of Mines and the industry itself. This project is funded by the Government of Ontario.

Mineral Exploration and Development Potential in Manitoba: Guidelines for Policy Formulation
Brian W. Mackenzie, Michael Doggett, Michel Bilodeau, Centre for Resource Studies

The study has three objectives:

1. To assess the economic potential of mineral exploration and mine development in Manitoba.
2. To examine Manitoba's competitive standing in the shield region and in Canada.
3. To analyze the effects of Manitoba's mining taxation policy on economic potential and competitive standing.

The first phase of the study focuses on Manitoba-specific assessments using the existing CRS data base for base metal and gold mining. The report on this work was submitted on February 20th.

In the second study phase, Manitoba exploration expenditure and mineral deposit data will be revised, updated, and expanded to include nickel. The time series will be extended to include 1986-88, and the effects of an appropriate range of Manitoba mining taxation policy options will be examined.

Update of Sourcebook on Native Participation in the Mineral Industry
Mary Louise McAllister and Tom Schneider, Department of Political Studies, Queen's University

The objective of this short-term project is to list and briefly describe the federal government programs which could be used by Native individuals, organizations, companies, or communities to participate in mineral industry (excluding oil and gas).

Canadian University Research and Teaching Resources in Advanced Industrial Materials
John McIntosh, Department of Chemistry
University of Windsor

This study will document and analyze the research and teaching resources (the human resources infrastructure) in advanced industrial materials in Canadian universities. It will identify strengths and weaknesses, and establish a framework for monitoring future trends in AIM resources in Canadian universities. The study will provide an information base which can be used to evaluate the adequacy of these resources for the present and future AIM needs of Canadian industry.

New Publications

The following new publications arising from the CRS research and seminar programs were released during 1989-90.

Mineral Exploration and Mine Development Potential in Ontario: Economic Guidelines for Government Policy, by B.W. Mackenzie, M. Bilodeau, and M. Doggett, published in April 1989. Number 9 in the CRS series of technical papers. This report assesses and compares the economic potential of base metal and gold exploration and mine development in Ontario as a basis for mineral policy formulation.

Economic Potential of Base Metal and Gold Mining in Newfoundland: Assessing the Impact of Regional Development Policy Options, by B.W. Mackenzie, M. Bilodeau, and M. Doggett, published in April 1989. Number 10 in the CRS series of technical papers. This report assesses the economic potential of base metal and gold mining in Newfoundland with a view to providing guidelines for government policy formulation.

Metals Demand and the Canadian Metal Industry: Structural Changes and Policy Implications, by C. Nappi, published in April 1989. Number 23 in the CRS series of monographs. This report investigates the reasons for the atrophy of demand for metals, examining in detail both cyclical and structural causes.

Federal and Provincial Taxation of the Canadian Mining Industry: Impact and Implications for Reform, by R.W. Boadway, K.J. McKenzie, and J.M. Mintz, published in August 1989. Number 24 in the CRS series of monographs. This report examines federal and provincial taxation of the mining industry in Canada, and finds strong evidence of inefficiencies in the existing tax regimes.

Marketing of Nonferrous Metals, edited by L.M. Jackson and P.R. Richardson, published in August 1989. It contains the proceedings of a policy discussion seminar convened by the Centre for Resource Studies in 1988. The focus of the seminar was on the marketing of minerals in a changing world economy.

Economic Aspects of Gold Exploration: How Much is Too Much?, by B.W. Mackenzie and M. Doggett, published in November 1989. Number 44 in the CRS series of working papers. This report examines the premise that gold exploration is economically worthwhile.

U.S. Trade Barriers and Canadian Minerals: Copper, Potash and Uranium, by D.G. Haglund and A. von Bredow, published in April 1990. Number 25 in the CRS series of monographs. This report analyzes recent tendencies towards protectionist trade practices in the United States by detailed examination of the experience of Canadian exporters of these minerals, and assesses the potential for future trade in light of the Free Trade Agreement and the Uruguay round of GATT negotiations.

CRS Researchers

Presentations

Brian Mackenzie

"Economic Aspects of Mineral Exploration", Western Mining Corporation, Melbourne, June 1989

"Economic Guidelines for Gold Exploration", Curtin University of Technology, Perth, June 1989 (one-week seminar)

"Economic Guidelines for Exploration Planning", Western Mining Corporation, Kalgoorlie and Melbourne, June-July 1989 (two one-week seminars)

"Economic Analysis for Mine Evaluation and Operating Decisions", Australian Mineral Foundation, Adelaide, July 1989 (one-week seminar)

"Worldwide Trends in Gold Supply", ABRAMO-Associacao Brasileira dos Mineradores de Ouro, Rio de Janeiro, July 1989 (one-day seminar)

"Economic Guidelines for Exploration Planning", Queen's University, December 1989 (one-week seminar)

"Economic Aspects of Mineral Exploration", Westminer Canada Limited, Chibougamau, January 1990

Margot Wojciechowski

"International Comparison of R&D Expenditure Trends in Earth Sciences", Geological Survey of Canada, Ottawa, May 11, 1989

"Framework for Mineral-Related R&D Funding Comparisons", Department of Mineral Economics, Colorado School of Mines, Boulder, Colorado, November 10, 1989

"The Mineral Industry and Mineral Policy in Canada", Department of Political Science, Queen's University, Kingston, March 16, 1990

Publications Outside CRS

Brian Mackenzie

"Mineral Exploration Economics: Focusing to Encourage Success", pp. 3-21 in *Proceedings of Exploration '87: Third Decennial International Conference on Geophysical and Geochemical Exploration for Minerals and Groundwater*, G.D. Garland ed., Special Volume 3, Ontario Geological Survey, Ministry of Northern Development and Mines, Toronto, 1989, 914 pp.

Economic Aspects of Mineral Exploration, prepared for Companhia Baiana de Pesquisa Mineral (CBPM), Salvador, Brazil, September 1989, 74 pp.

Economic Potential of Gold Exploration and Development in Brazil, prepared for Departmento Nacional da Producao Mineral (DNPM), Brasilia, September 1989, 86 pp.

CRS Perspectives

Two issues of *CRS Perspectives* were published during the current year. *Perspectives* is an occasional bulletin that contains comment about the Canadian mineral industry, reviews, and news of CRS activities and publications. *Perspectives* is sent to the entire CRS mailing list of about 3,500 individuals and institutions in Canada and abroad with interests in mineral policy issues.

Articles are either commissioned specifically for the newsletter or are offered to the Centre for publication. This year's issues featured articles on such diverse topics as the impact of the goods and services tax on the Canadian mining industry, Ontario Hydro's use of western Canadian coal, compliance with environmental requirements, the economics of pollution control, and the effects of subsidies on exploration efficiency.

CRS Policy Discussion Seminars

The CRS Policy Discussion Seminars are designed to bring together senior individuals from federal and provincial governments, corporations, universities, trade unions, and other interested groups to discuss current mineral policy issues. The informal atmosphere is conducive to the free and constructive exchange of views. In a typical two-day session, six or eight speakers present background information and views on the issue. Subsequent discussion in small groups and open sessions allow the participants to develop a mutual understanding of the problem and of other viewpoints, and to consider potential solutions. The proceedings are published, including the papers and some analysis and conclusions.

Human Resource Planning for the Mining Industry

In November 1989, the twentieth CRS Policy Discussion Seminar on Human Resource Planning for the Mining Industry was held at Queen's University. It brought together an interdisciplinary group of planners, executives, and researchers from senior levels in the mining industry, government, and university. The purpose of the seminar was to focus on the problems associated with ensuring that the mining industry maintains an adequate supply of properly trained professionals and skilled technical workers.

Financial Arrangements

The Centre disbursed $254,313 on administrative and $304,596 on research activities during the year.

Continuing financial support is received from The Mining Association of Canada (MAC) and Energy, Mines and Resources Canada (EMR). Funding from MAC for 1989-90 was $196,000 per year ($78,400 for administration and $117,600 for research). This funding was matched by EMR. A total of $29,555 was recovered from the sale of publications and seminar registration fees.

The Centre also seeks to serve the research needs of other agencies. In the current year, research support was received in the amount of $166,717 from agencies other than the Centre's permanent sponsors.

The Board of Directors

The Board consists of sixteen members. The Executive Director and the Advisory Council Chairman are ex-officio members. Of the remainder, four are appointed by The Mining Association of Canada, three by Energy, Mines and Resources Canada, and seven by the Principal of Queen's University. The Chairman is C. George Miller, President, The Mining Association of Canada. The chairman of the Research Advisory Committee has observer status at Board meetings.

The Board met twice during the year; the spring meeting was held April 26, 1989, in Kingston and the fall meeting took place October 17, 1989 in Ottawa. On these occasions, the Board discussed a number of ongoing and potential research themes, the recommendations of the Advisory Council, and various administrative and policy matters.

During 1989-90, Pat MacCulloch, Bob Uffen and Peter Calder retired from the Board, and Tom Courchene, Director, School of Policy Studies, Queen's University; John Dixon, Professor, Geological Sciences, Queen's University; and Ian Bayer, President and C.E.O., Kerr Addison Mines Limited; joined as new appointees.

Members of the 1989-90 Board of Directors were as follows:

C.T. Asplund, Queen's University
I.D. Bayer, Kerr Addison Mines Limited
J. Beausoleil, Department of Finance
R.W. Boadway, Queen's University
T.J. Courchene, Queen's University
J.M. Dixon, Queen's University
M.D. Everell, Energy, Mines and Resources
K.C. Hendrick, Noranda Minerals Inc.
G. Mahoney, L'Energie et des Ressources
W. McLatchie, Queen's University
C.G. Miller (Chairman), The Mining Association of Canada
D.L. Morgan, Placer Dome Inc.
E.K. O'Brien (Observer), Inco Limited
R.E. Simeon, Queen's University
R. Smith, Queen's University
P. Steen, Corona Corporation
R. Sully, Energy, Mines and Resources
M.J. Wojciechowski, Centre for Resource Studies

The Advisory Council

The Advisory Council currently has a membership of sixty-four. All researchers associated with the work of the Centre are appointed to membership for the duration of the research or a minimum of one year. Other members, representing governments, industry, labour, the professions, and other interested organizations and groups, are appointed for a three-year term. The functions of the Council are to advise the Board, primarily on the research program, and to act as advisors to the Centre's staff.

The Council's 1989 annual meeting was held on April 27, under the chairmanship of Gilles Mahoney. Reports on the Centre's ongoing activities were received and discussed, along with presentations by a number of CRS and external researchers.

Advisory Council members for 1989-90 were as follows:

Appointed Members

B.J. Barton, Canadian Institute of Resources Law
T. Berrett, Centre for Resource Studies
M. Bilodeau, McGill University
K. Brewer, Energy, Mines and Resources
W.K. Buck, Consultant
D. Davis, The SNC Group
M. Doggett, Centre for Resource Studies
A. Dorr, Industry, Commerce & Tourism
D. Eldon, The Mining Association of Canada
J.M. Fleming, Department of Mines and Energy
J. Gana, Colorado School of Mines
R.G. Ginn, Prospectors and Developers Association
A.G. Green, Queen's University
D.G. Haglund, Queen's University
I. Haugh, ILAM Associates Limited
D. Hull, Energy, Mines and Resources
L.M. Jackson, Centre for Resource Studies
W.G. Jeffery, The Mining Association of Canada
R.J. Keyes, Dept of Primary Industry & Energy
J. Kuryllowicz, Industry, Science & Technology
J. Larche, Prospectors and Developers Association
J. Lazarovich, Indian and Northern Affairs Canada
B.W. Mackenzie, Centre for Resource Studies
G. Mahoney, L'Énergie et des Ressources
R. Mason, Queen's University
G.B. McRae, Energy, Mines and Petroleum Resources
D.L. Morgan, Placer Dome Inc.
J.H. Nantel, Centre de Recherche Noranda
C. Nappi, École des Hautes Études Commerciales
E.K. O'Brien, Inco Limited
N.D. Olewiler, Queen's University
G. Peeling, Energy, Mines and Resources
P. Reid, Ontario Mining Association
P.R. Richardson, Queen's University
R.E. Simeon, Queen's University
M.J. Wojciechowski, Centre for Resource Studies
D.J. Worth, Canadian Imperial Bank of Commerce

Research Members

D.L. Anderson, Queen's University
D.W. Barnett, Macquarie University
D.I. Bleiwas, U.S. Bureau of Mines
R.W. Boadway, Queen's University
M.A. Green, Centre for Resource Studies
T. Hazledine, University of British Columbia
J. Mintz, Queen's University
M.L. McAllister, Queen's University
J.M. McIntosh, University of Windsor
C. O'Faircheallaigh, Griffiths University
K.S. Palda, Queen's University
K. Rutherford, Queen's University
Xu Tao, Centre for Resource Studies

The Research Advisory Committee

The Research Advisory Committee was formed in 1976 to advise the Board of Directors and executive director of CRS on research goals and priorities, and on the selection of external research projects. The Committee consists of individuals knowledgeable about the mineral industry and research methods, chosen from industry, government, private consulting, and universities. The Committee decides on the allocation of grants-in-aid of research and advises on the awarding of research contracts. In 1981 the Committee members all joined the Advisory Council of CRS as well. The chairman for 1989-90 was Keith O'Brien.

Research Advisory Committee members for 1989-90 were as follows:

P. Andrews, Energy, Mines and Resources
B.J. Barton, Canadian Institute of Resources Law
K. Brewer, Energy, Mines and Resources
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